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## Modern Packaging of Grease Lubricants

By C. W. BROWNE, Editor "Modern Packaging"

Presented Before 9th Annual Meeting N.L.G.I.

Many of the usual generalities on packaging do not apply to your business. You enjoy certain obvious advantages. For one thing you don't need to worry about the Food and Drug Laws. You can select packaging materials with no thought of endangering the health of your customers, though, of course, you must think of corrosion, leakage, seepage, etc. In common with everyone else, your packaging touches production on the one hand and merchandising on the other. That means that you must think of packaging in your own plant as well as in terms of its adaptation to your outlets and your distribution plan.

Again like everyone else today, you must cope with the problems of shortage of metals, corrugated and fibre containers, and various other materials which all of us have taken for granted for a great many years. It seems to me, too, that I have heard something about a shortage in your merchandise as well as the materials for packaging your goods.

Incidentally, you may hear it said that much in the way of shortages is merely talk for alarmist purposes; that the situation is being over-played in order to wake people up to the seriousness of the situation. As to how much of this there actually is, one man's guess is as good as another's. My own feeling is that it is far better to overdo now in order to avoid some of the difficulties in which Great Britain found herself. She was smug, complacent and apathetic for a long time, and only reluctantly adopted controls and regulations which became absolutely necessary. Those controls and regulations are here, many of them, and more are just ahead of us; but we have time to prepare ourselves for the shocks and dislocations they are bound to bring.

As to the actuality of shortages, in many cases it's a matter of simple arithmetic. Take, for instance, the most important basic element in packaging, paper and pulp: Reliable estimates made not by bureaucrats but by level-headed business men indicate that defense needs plus civilian requirements for 1942 will call for upwards of 25 million tons of this raw material. But the total mill capacity of our country has never exceeded 19 million tons. Foreign sources are virtually non-existent as far as we are concerned; that means that we here among ourselves must make up—somehow or somewhere—for a 33 1/3 percent shortage. The hope is to be able to spread the available tonnage over a greater square yardage, to do it without resorting to the priorities plan, and while doing it to preserve the business existence of some 60,000 proprietorships and hold the jobs of some 900,000 workers in the lines affected. That's an ambitious plan, but it bids fair to succeed, first, because the shortages aren't yet critically acute, and second because the program is being administered by the cooperative action of intelligent and patriotic Americans.

Most metals, on the other hand, are under priorities, and without a doubt most of you have felt the pinch. You realize fully that shortages are going to make you go without many things. Therefore, you will have to exercise ingenuity to devise substitutes—the problem is one of adaptation; and probably for no two concerns is the answer the same.

Perhaps it would help if you were to analyze your own packaging in the light of its functions, and decide which of those functions are most important—for YOU. In general, the functions of packaging can be reduced to a simple formula:

Convenience  
Economy  
Protection  
Appeal  
Identify  
Inform  
Invite

That simple formula is applicable to any product; and for each product, the emphasis placed on one of those factors may vary widely. For lubricants, obviously convenience and protection are of prime importance, but I question whether all of you or even a majority are ready to abandon all forms of sales appeal even during the stress of an emergency; and certainly economy is always in order.

Vitally important as self-analysis always is, it should be supplemented by an examination of the field; and that brings us to what I think will be something of real help to you.

As most of you know, when Modern Packaging was invited to take part in your program, we decided that the best way to be of real help to your industry would be to have our Institute of Package Research conduct a sort of survey of current packaging practices and use that as the basis for conclusions and recommendations which would take present shortages into consideration, as well as points bearing on the future.

Accordingly, questionnaires were sent to some sixty companies, of which 40 were members of the National Lubricating Grease Institute and the remainder were non-members but in the same line of business. The response was very gratifying. Of 32 replies (25 from members and 7 from non-members) 28 were capable of being tabulated.



May I take this occasion to thank all those who participated, and to say that the spirit of helpfulness shown by the replies augurs well for the success of any cooperative program you may adopt.

Now for a brief report. You may hear nothing you didn't know previously; but if by telling you what you yourselves have told me I can help you to get a new perspective on the packaging of lubricating greases, I shall feel that my efforts are worth while.

The first question asked for a listing of sizes of grease packages. It won't be a surprise to any of you when I tell you that the answers disclosed a multiplicity of sizes, styles and quantity designations. This variety is due in part, no doubt, to different consistencies, purposes and grades of greases; but I strongly suspect that there's a Topsy-like growth in it, too, based on competitive angles or on the task of catering to a particular line of trade. The answers went all the way from a 2 oz. can (1 mention) to a 450 lb. drum (2 mentions). The 25 lb. size was mentioned 28 times; the 10 lb., 26 times; the 5 lb., 25 times; the 1 lb., 24 times; the 100 lb. drum received 22 mentions; the 200 lb. and the 50 lb. tied with 8 mentions, and the various sizes in between those received scattering votes.

Answering the question as to most popular sizes, the 100 lb. drum was mentioned 20 times, or 90% of those who indicated using it. The 25 lb. size is supported by 70% (19 out of 28) who use it—and apparently all of you use that size. The 5 lb. can received a 44% popularity vote (11 out of 25) and the 400 lb. drum 43% (7 out of the 16 users.) However, when it is recalled that this largest size is variously designated as 400 lb., 420 lb., 450 lb., 50 gal., 55 gal., and 58 gal., the vote becomes 34% (10 out of 29 users.) The 10 lb. can has a 30% constituency (8 out of 26 users) and the 1 lb. comes in for a 28% popularity rating (7 out of 24).

To recapitulate those standings: The most popular sizes rank as follows:

- 100 lb. drum—FIRST
- 25 lb. size —SECOND
- 5 lb. can —THIRD
- 400 lb. drum—FOURTH
- 10 lb. can —FIFTH
- 1 lb. can —SIXTH

Conversely, what sizes can be eliminated? According to your own "unpopularity poll" the results would be:

- Least popular—or
- Easiest to discontinue ..... 2 and 3 lb. cans
- Next easiest ..... 50 lb. drum
- Third in unpopularity ..... 200 lb. drum
- Fourth in unpopularity ..... 10 lb. can
- Fifth in unpopularity ..... 1 lb. can
- Sixth in unpopularity ..... 5 lb. can

Naturally I have no means of knowing how you arrived at those judgments. I mere-

ly give the results as they appeared from tabulating your answers.

The next series of questions concerned shipping containers. In view of the current difficulties and delays connected with containers, many of you may envy the company who told us that most of their packages were strong enough to ship without containers. I strongly suspect many of you will come to that before long. The figures point to certain definite recommendations which I'll come to later:

The great majority use containers, mostly corrugated or fibre; for export, wood is used. The 2 and 4 oz. packages are packed one gross to a container. The 1 lb. size, as reported by 22 questionnaires, is packed in 12's, 24's, 36's and 48's, with the 24's leading.

The 2 lb. and 3 lb. occur mostly in 12's. One answer reported using a container for a single 5 lb. can; others pack in 6's, 10's and 12's. The five-pound size, apparently, tops the list in using cartons; next being the 1 lb., and third the 10 lb. Eight concerns pack the 25 lb. size in a single carton, but no other pack is mentioned for that size; the 10 lb. size is packed singly, in 4's and in 6's.

We learned that ten of you apparently did not differentiate, whereas 18 use a different type of package for heavy consistency greases as compared with semi-fluid greases. Without taking time to make a detailed analysis of what these differences are, it can be said that they are based on

- (1) different weights or gauges;
- (2) varying types of closures;
- (3) use of pouring spouts; bung openings, etc.
- (4) re-use types of containers.

As to materials used for packages, black iron received the most votes, especially, it was remarked, for the larger drums. Tin came second, terne plate third; with scattering votes for lacquered black iron, galvanized, paperboard cartons, etc.

As to experiments with other materials, because of the current situation, I want to report on that quite fully:

Seven mentioned experimenting with fibre. As to results, one reported "Inconclusive;" two reported, "Not entirely satisfactory," and one said definitely, "Developed leaks in transit."

One reported experimenting with a "parchment or latex film," but had no results to report.

One spoke of using wood barrels some time ago, results "not altogether satisfactory."

One mentioned trying a burlap bag with a special lining, but had nothing conclusive to say about results as yet.

One mentioned using lead tubes in conjunction with a dispenser gun; these, how-

ever, proved difficult to keep in proper condition for dispensing and the project was abandoned.

Two have used paperboard cartons, for smaller sizes, with apparent success. No particulars were given as to how this paperboard was treated. One reported a ten-year old experiment that didn't work out, in which a paper container with a coated inside was used for the 10 lb. size.

Three reported a satisfactory use of a paper drum with steel heads for the 100 lb. size; one found a container described in similar terms as unsatisfactory. One reported that a paperboard container (details lacking) would not withstand rough handling.

The next question read: "What current changes have you already made or do you contemplate making to cope with present or prospective shortages?" Thirteen (all told) either didn't mention anything or definitely wrote "None." Whether this means not planning or not telling I wouldn't know—take your choice. Five indicated that some sizes are or will be eliminated; six told of changing to other materials, mentioning specifically changing from tin to terne, from terne or galvanized to black iron, etc. One is discontinuing packages for which materials are unobtainable. One is eliminating variety of colors on packages and dropping the lithographed packages. One is using thinner gauge for as many packages as possible. Several say they will be prepared to reduce styles if necessary.

Informative packages seem to outnumber; fourteen say "yes—we use informative copy"; three more specify small packages show it; two more use it on branded items; while seven don't use it. Valid reasons are offered by some for not doing so: One says that the effort to standardize and reduce inventories of packages leaves no room for informative copy. Another says that in the great percentage of cases the package is not seen by the ultimate consumer, so informative copy would be "born to blush unseen."

It would be interesting to delve deep into the next question, which asked, "What elements in your package design have you found by actual experience to be most helpful in sales?" Distinctive color seems to outweigh the other elements—it received 16 mentions as compared with fourteen each for brand name and trade mark, with ten votes for re-use features—eleven if you add to that a mention of "convenience."

Paper labels don't stand much chance in connection with your products, which isn't strange, considering their nature. Only 3 of you use them, one specifying on large sizes only; whereas 26 use designs lithographed on metal. Seven use plain packages, especially in the larger sizes; two stencil design or identity features on with spray guns, and

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GEORGE W. MILLER ..... *Editor*  
498 Winspear Avenue, Buffalo, N. Y.

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two use decalcomanias; two more indicate using a number of methods.

The last question really brought home the bacon in the form of suggestions (a) to affect economies in packaging, (b) in the direction of simplification or standardization, and (c) to increase consumer acceptance. I can't do better than to pass them on to you in almost the identical form in which they reached us. In fact, by your own answers to this question you have permitted me to avoid the responsibility of making any recommendations. However, I do want to make certain observations as to some of the suggestions, based on a general perspective of the entire field of packaging. That I should like to do after I have reported your own suggestions:

## TO ECONOMIZE:

1. Eliminate premium packages or containers.
2. Do more development work on fibre containers.
3. Use black iron more in place of tin, with coated inside to prevent corrosion.
4. Eliminate some of the smaller sizes.
5. Reduce number of sizes and types, especially duplications.

6. Discourage odd lot purchases.
  7. Reduce gauge or weight of metals.
  8. Universal adoption of general design.
- SIMPLIFICATION AND STANDARDIZATION:  
(Some of the above belong here)
9. Standardize sizes and types.
  10. Use blank panel litho package for smaller packages and standardized color for larger.
  11. Standardize shapes and designs to reduce inventory and storage space.

## TO INCREASE CONSUMER ACCEPTANCE:

12. Proper blending of colors in design.
13. "Consumer acceptance won't be helped by substitute packaging—but (during emergency) merely to maintain consumer favor is an accomplishment."
14. "Irrelevant at this time" to consider increasing consumer acceptance.
15. "All packages should be of same general shape, size, and appurtenances."
16. "Develop a type of package permitting ready removal without waste or contamination."
17. "Use packages that are practical—easy to serve from—attractive, especially in display."
18. Pass benefits of economies on to consumers.
19. Adopt re-use features on packages.
20. "It is impractical to increase consumer acceptance by means of a package—in majority of cases consumer doesn't see package."

There—I think you have some thoughts which should be handed to a committee on package simplification,—and my own emphatic recommendation would be to appoint such a committee to consider those problems for the industry. Now, if you'll permit me to make my two or three observations, I'll be finished.

First, with regard to standardization: Are you sure you want standardization? Simplification, yes, and reduction of number of packages; but don't forget that every step toward standardization is a step away from individuality. It is true that we must all make sacrifices for national defense; but that must not be a cloak for the destruction of the competitive principle—unless you are ready to abandon that principle entirely.

As a matter of fact, it shouldn't be necessary to remind anyone in your industry that branded merchandise is under fire. The trade mark is being regarded as contributory to monopoly, and the right to advertise your merchandise is being called in question. Probably I'm selfish—I'll admit there wouldn't be any *Modern Packaging*, nor would any of us connected with that magazine have jobs, if those extreme "leftish" ideas prevailed; but it goes deeper than that. Packaging is the basis for modern merchan-

(Continued on page 7)

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## LEADING OIL PRODUCING COUNTRIES 1940

# OF OIL—where it comes from...

\* Courtesy Imperial Oil Review



**D**ESPITE wartime conditions which restricted production in some countries, world production of crude petroleum in 1940 reached a record figure of 2,144,463,000 barrels—a net increase of 67,971,000 barrels over the previous year.

More than 35 countries produce the world's oil. Lack of official confirmation from some countries leaves a certain margin of error in total estimates, but where such conditions exist figures used are based on estimates secured from the best available source of information.

The United States of America leads the world. Soviet Russia ranks second, and Venezuela third.

The principal factor in increased world production was a 6.87 per cent increase to 1,351,849,000 barrels in the United States, which offset reductions elsewhere. Russia showed a small

increase of 182,000 barrels over 1939 output. Hungary had the biggest percentage of increase, its 1940 production of 1,755,000 barrels nearly doubling 1939 figures.

Of the first thirteen major sources of world oil supplies, Iraq showed the heaviest percentage of decline, dropping from over thirty million barrels in 1939 to 24,225,000 in 1940.

Other leading oil-producing countries whose production has declined were Venezuela, Netherland India, Roumania, and Peru.

In continental terms, North America leads. European production led South America's by a fractional percentage, while Africa ranked last among oil producing continents.

Canada's production was 8,718,000 barrels in 1940, an increase of 881,000 barrels over 1939.

# Performance Specifications for Greases\*

By ROBERT C. ADAMS AND HARRISON E. PATTEN

(Continued from previous issue)

The deterioration of stable lubricants under high-temperature conditions is not rapid enough to be measured by tests under simulated service conditions in the Navy Grease Machine. In order to accelerate the rate of oxidation and deterioration, a high-temperature beater was devised. This apparatus, as illustrated in Fig. 3, consists of a single-row ball bearing, 2 3/4 in. in outside diameter, with the inner race clamped by a wing nut to the lower end of the vertical shaft of a

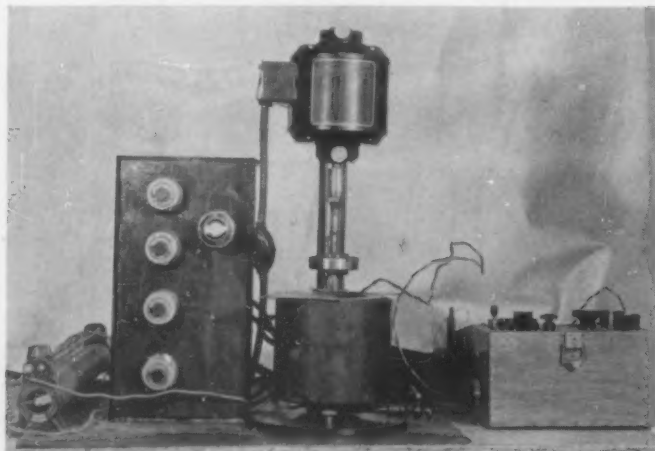


FIG. 3—High-Temperature Beater.

3600-rpm motor. A counter-balanced cup with electrical heaters in its jacket can be raised onto the bearing so that vertical ribs

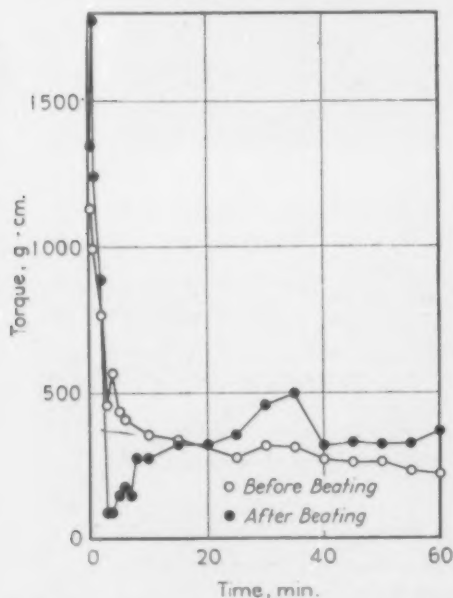


FIG. 4.—Torque Measurement on Grease Before and After High-Temperature Beating.

in the interior of the cup hold the outer race and prevent its rotation.

The standard high-temperature stability test consists of placing 1/2 lb. of grease in the cup, heating to 400 F., and then beating with the rotating bearing for 7 hr. At the end of the test the residue, or grease, if it is still recognizable, can be used to fill a test bearing and repetition of the Navy Grease Machine tests gives an indication of the extent of damage to the original properties of the lubricant. The slight increase in torque after beating indicated in Fig. 4, illustrates a grease satisfactory for high-temperature service.

On the basis of results obtained with the above apparatus, the Engineering Experiment Station has prepared a specification for high-temperature lubricants<sup>3</sup> which has been used for purchases of high-quality greases for almost two years. The results have been entirely satisfactory.

## LOW-TEMPERATURE GREASE

The second application of performance testing to specification of greases was to the problem of aircraft-control lubricants. Bearings in aileron and rudder hinges and in pulleys in control cable trains are exposed to ambient temperatures. This means that bearing and lubricant temperatures may vary from that of metal in tropical sunlight, about 165 F., to the temperature of the stratosphere of -60 to -65 F. No one can predict suitability throughout such a range from composition and penetration at 77 F. Performance tests are required.

The original apparatus for low-temperature mobility testing is illustrated in Fig. 5. It consists of a vertical spindle of hard rubber with the inner race of the

test bearing clamped to the lower end and a pulley on the upper end. The outer race of the test bearing is held between the two parts of a liquid-tight sleeve so that sleeve and bearing can be placed in a bath of alcohol and dry ice without wetting the lubricant in the test bearing. The spindle has an axial hole for a thermometer whose bulb lies at the center of the test bearing. After the accurately lubricated test bearing has been assembled in the apparatus and cooled to the test temperature (-40 or -50 F.) a predetermined torque is applied through the pulley and the time required for the initial revolution is determined. Temperature is the most critical of the several factors affecting consistency and reproducibility of results. The relationship between plasticity of the grease and temperature is similar to the viscosity-temperature curve for lubricating oil. As shown in Fig. 6, the logarithm of the time of rotation versus the temperature gives a straight line.

In order to obtain more accurate temperature control and at the same time to increase the number of determinations per man-day a five-spindle, air-bath apparatus

\* Courtesy American Society for Testing Materials

(Continued on page 7)

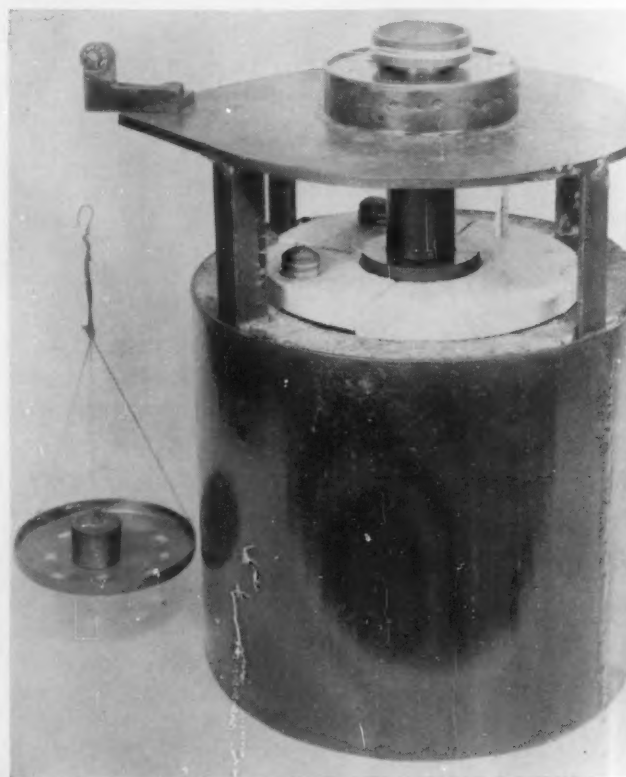


FIG. 5—Cold-Test Apparatus.

<sup>3</sup>Navy Department Aeronautical Specification M-372, dated September 1, 1939; copies obtainable from Bureau of Aeronautics, Navy Dept., Washington, D. C.



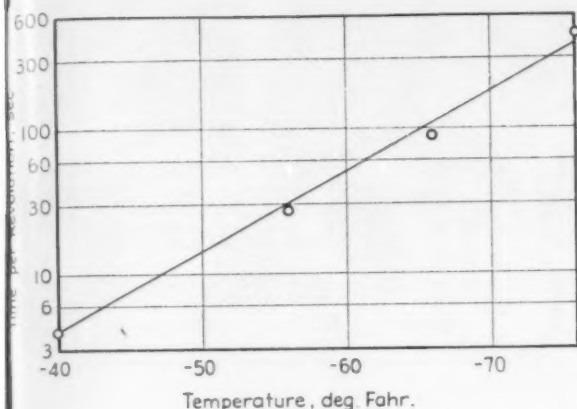


FIG. 6.—Effect of Temperature on Time for Rotation.

#### PERFORMANCE SPECIFICATIONS (Continued from page 6)

has been built. This is shown in Fig. 7. A rectangular, jacketed, steel trough supports the five spindles. A small pump circulates alcohol from a coil in the cold bath at the bottom through a continuous coil of finned tubing in the jacket, while a centrifugal blower at one end of the trough maintains circulation of air through the jacket and back over the spindles and test bearings. Temperature is controlled by a pyrometer in the pump-motor circuit actuated by a thermocouple in the air stream in the trough. The temperature difference from end to end of the trough does not exceed 2 F. after equilibrium has been attained so that the temperature on any spindle is within 1 F. of the control temperature.

(To be continued)



FIG. 7—Five-Spindle Cold-Test Apparatus.

#### "MODERN PACKAGING"

(Continued from page 3)

dising, which means the supply of greater satisfactions for the consumer at lower prices than at any time in the history of the world. So—standardize and sacrifice and do your share for defense; but don't standardize your own identity out of existence. With all due respect for the member who says that cultivating consumer acceptance is "irrelevant at this time," I do not believe he meant to exclude selling and merchandising methods which look forward to the days when the emergency will be over. I think good selling and merchandising *now* and *then* is going to

be more necessary than ever,—and good packaging — as good as material shortages permit — is part of that picture.

Nor can I agree altogether with the remark that informative copy can be dismissed because the ultimate consumer seldom sees the package. Many of you enjoy a sizable business with the farmers. Informative copy certainly is not out of place on those packages. And I'm inclined to think also that it would work a hardship on some concerns if premium type packages or re-use features were banned. You may have to trim the sails to some degree—shortages will see to that—but there must be a way to retrench and still retain the principles of competition and individuality.

One last thought: I'm under promise not to disclose certain names of those who answered our questionnaire; but many of you made such interesting statements about experiments in process that it seems to me you have a golden opportunity to pass on to your association mates the specific details about what you have learned about various materials. You have the answers to your own problems right in this room. All I've been able to do is act as a clearing house for ideas that you have given me.

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(Continued from previous issue)

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(To be continued)

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